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Journal of the Society of Arts.

FRIDAY, JANUARY 3, 1868.

Announcements by the Council.

Artisans' Reports on the Paris Exhibition.

The Reports of the Artisans selected by the Council to visit the Paris Exhibition are now ready, and may be had of the Society's publishers, Messrs. Bell and Daldy, York-street, Covent-garden. One volume; demy 8vo., 732 pages, price 2s. 6d. The volume contains reports, by upwards of eighty artisans, upon the principal industries represented in the Exhibition, as well as special reports on the condition and habits of the French working classes.

Technical Education.

The Council feeling the great importance of this subject, have resolved to hold a Conference at the Society's house, on the 23rd and 24th inst., the particulars of which are explained in the following circular:—

Society for the Encouragement of Arts, Manufactures,
and Commerce, Adelphi, London, W.C.,
9th December, 1867.

Technical Education.

Sir,—I am directed by the Council of the Society for the Encouragement of Arts, Manufactures, and Commerce, to invite your (Chamber of Commerce or other body) to appoint its President or other representative, to attend a Conference which is to be held here, on Thursday and Friday, the 23rd and 24th of January next, to consider and suggest what measures may be taken to promote the industrial and scientific education of the various classes of the community.

The Conference will commence its sittings on Thursday, the 23rd of January, 1868. The Chairman of Council will take the chair at 12 o'clock precisely.

At as early a period as possible, the Council will issue to each gentleman who accepts their invitation to the Conference a programme of the probable course of its proceedings; and, to enable the Council to do this in a satisfactory manner, I am to request you to inform me, with the least possible delay, whether a representative from your [ ] will be able to attend the Conference; whether your [ ] has any special resolutions to suggest, or any particular points to which it desires to direct attention; what general measures for the promotion of education it may conceive to be requisite; and what institutions of a specific character are needed in your own neighbourhood to give the greatest practicable facilities for the acquisition of knowledge applicable to your local industries.

The object of the Conference is to ascertain, not merely what the Society of Arts, Manufactures, and Commerce, but what the nation at large can do to promote technical education among the workmen, the foremen, the overlookers, and the employers in Arts, Manufactures, and Commerce; and it is hoped that an expression of opinion by this Conference may tend in some degree to diminish the difficulties with which the solution of this vital question of national education is at present confessedly surrounded.

I am, your obedient servant,
P. Le Neve Foster, Secretary.

The foregoing circular has been forwarded to:—

- The Mayors of the Towns which are the principal seats of manufacture in the United Kingdom.
- The Presidents of the Chambers of Commerce and Agriculture.
- The Presidents of all Societies and City Companies which have co-operated with the Society in respect of Education or Art-workmanship.
- The Presidents of Institutions in Union with the Society of Arts.
- Her Majesty's Inspectors of Schools, Factories, Mines, and Collieries.
- Professors at University, King's and other Colleges.
- The Examiners of the London University.
- The English Jurors at the Paris Exhibition of 1867.
- The Society's Judges in Art-Workmanship.
- The Society's Examiners in Education.
- The Society's Visiting Officers.
- The writers of letters to the Schools' Inquiry Commission.

And many other gentlemen connected with education.

Members of the Society taking a special interest in this subject are invited to attend.

Subscriptions.

The Christmas subscriptions are due, and should be forwarded by cheque or Post-office order, crossed "Coutts and Co.," and made payable to Mr. Samuel Thomas Davenport, Financial Officer.

Proceedings of the Society.

Food Committee.

The Committee met on Wednesday, Dec. 4th. Present—Mr. Harry Chester (in the chair), Captain Grant, Messrs. H. C. E. Childers, M.P., W. H. Michael, J. T. Ware, E. Wilson, and G. F. Wilson, F.R.S.

Mr. Michael laid before the Committee the following report upon McCall's Australian boiled beef and the condensed milk of the Anglo-Swiss Company:—

Boiled Beef.

I have examined and tried two tins of this beef, 4lbs. in each, cost 7½d. per lb. The meat is of first-rate quality, and the fat so much diminished in the tins as not now to be in any way excessive or wasteful. The meat is so much cooked in its preparation that any further application of heat deteriorates it and diminishes its usefulness as an article of food. It is quite fit to eat as it is found in the tins, cold, but few persons would like it in that condition, and it is very desirable that further attention should be given to the method of preservation, in order to provide an article which could be converted into stews, curries, &c., without disintegration, which is now inevitable if it is further cooked.

Condensed Milk.

This is milk evaporated and, by the addition of sugar, converted into a syrup, appearing like very light-coloured honey. It is pleasant to the taste, and, when diluted with water, can hardly be distinguished from sweetened milk, the only perceptible difference being a slight cocoa-nut flavour. Under the microscope it showed abundant crystals (sugar) and shrivelled globules. Upon the addition of water these by endosmosis became rapidly filled, and after the lapse of a few seconds it could not be distinguished from a specimen of fresh milk. For all purposes in which milk is required this will be found an admirable substitute where fresh milk cannot be procured. The only drawback to its use is its great sweetness, which would be an objection with persons who dislike sweetened tea and coffee. I should suggest the desirability of a largely diminished use of sugar where the preparation is not to be subjected to the high temperatures of southern latitudes, and that there should be two kinds sold, one for use on the continent of Europe and one for ships' stores. When better known, this preparation will command an extensive sale.

The Secretary laid before the Committee his report on the Mège Mouriès process of preparing flour and making bread, as used in the "Scipion" at Paris:—

Mège Mouriès Process for the Manufacture of Flour and Bread.

Having learnt that this process, to which Professor Wilson drew the attention of the Committee last April, was in operation at the Scipion establishment in Paris, I took the opportunity of my stay there during the summer to visit the manufactory. It is a large milling and baking establishment, under the charge of the municipality of Paris, from whence bread and flour are supplied to the barracks, schools, hospitals, and charitable institutions under the direction of the Government. The mill contains 12 pairs of stones for grinding, with the other necessary machinery for converting the produce into flour, and the bakery is of corresponding size. Being duly furnished with an introduction, from my friend M. Le Play, to the director of the establishment, I was shown the whole process, and every explanation was afforded me. Before entering upon a description of the special machinery used it will be necessary for me to give the Committee some information supplementary to that afforded by Professor Wilson, and in doing so I must, with the permission of the Committee, to some extent repeat a portion of the details given by Professor Wilson, in order that those reading the present report may have the whole subject before them in the one document, and may be thus enabled to follow the steps of the special process adopted at the Scipion for carrying out M. Mège Mouriès' discoveries. The Committee will recollect that Professor Wilson drew their attention to the structure of the grain as demonstrated by M. Mège Mouriès, viz., that it consists of an internal farinaceous mass, or true grain, covered with three outer skins, of the same character as the straw, but of no value in a nutritious point of view. These three skins, when the grain passes under the stones for grinding, are torn into the scales of various sizes, known under the general name of bran, and are readily separated by the usual process of "dressing," as the sifting process is termed. As regards the farinaceous matter which lies beneath these skins, it consists of layers, increasing in nutritious quality and in hardness as they recede from the centre. When the whole grain passes under the stones the central layer gives the whitest flour, or "farine de blé," as it is termed; the intermediate layer furnishes the next quality, the "gruaux blancs;" and the third layer, which is harder and near the external skins, gives the "gros gruaux," mixed with some portion of bran. In the usual process of manufacturing flour, those of the "farine de blé" and the gruaux blancs form together the flour of best quality, and thus the two internal layers only of farinaceous matter are used, leaving the third layer mixed with a certain amount of bran, for the food of animals only, it being found that any attempt to use this, though known to be nutritious, resulted in the production of brown bread. This, it was supposed, arose from the admixture of the bran, but on investigating the subject, M. Mège Mouriès discovered that this brown colour did not arise from the mere addition of the brown particles of the bran, but from a special fermentation which was set up when this portion of the grain was used. He found that this outer or third layer of farinaceous matter, though of highly nutritious character, was surrounded with a thin membrane or skin, which he termed the "embryonic" skin, and that next to this skin was a layer of cells containing a substance which he called "cerealine," and that this "cerealine" was the ferment which set up the special action producing the brown colour in the bread. M. Mège Mouriès divides the produce of the grain thus: the three outer skins, or bran proper, form 8 per cent. of the whole grain; the flour derived by the usual process, from the two inner layers only, 70 per cent., and the remaining portion from the outer layer, now available only for animals, 22 per cent. It is the flour from this latter portion, so valuable in a nutritious point of view, which it has been the object of M. Mège Mouriès to utilize for the food of man. He found that by taking the finest and whitest wheat flour, without any particle of bran, and adding to it the cerealine, he got a brown bread; whilst taking the lower class of flour with bran in it, and carefully preventing the action of the cerealine, he obtained a comparatively white loaf. He originally proposed a process of decortication, by means of which the three external skins, or bran, were got rid of before the grinding, and then the "true grain," consisting of the three farinaceous layers before alluded to, was ground into one mass at one grinding, thus obtaining the whole of the nutritive portion of the grain. The problem was how to utilise this, containing as it did the most valuable portion of the grain, and at the same time get rid of the action the "cerealine." This he accomplished by a process of bread-making, in which, taking advantage of certain chemical reactions, the action of the cerealine was repressed; but inasmuch as that process is no longer used, but a simpler and readier means has been adopted of obtaining the required result, it is needless to go into it. The decortication which he originally proposed, and which, after all, only got rid of the bran at an earlier stage of the process, is difficult, and has never been adopted at the Scipion. The brans were taken out by the usual process of dressing, and the "gruaux," as they are now, containing the cerealine, were allowed to mingle with the other descriptions of flour; and the chemical process above alluded to, for arresting the action of the cerealine in making the bread, was adopted, and thus the whole was utilised. This mode of making bread, however, as I said before, is now no longer used; indeed it never was carried out to any great extent. In order that the Committee may understand the process now at work, I will draw their attention shortly to the details of the manufacture. The corn, after passing through the mill-stones, comes out as meal, containing all parts of the grain ground to various degrees of fineness. It then undergoes the operation of "dressing," as it is termed; that is, it passes through a special process of sifting, by means of which the meal gets divided into its various qualities of fine flour, seconds, &c., and brans of different sizes, or, as the French term them—Farine de blé; 1st gruaux; 2nd gruaux; gruaux bis and the brans. This sifting is effected owing to the fact that the third or outer layer is much harder than the others, and by after operation of grinding, is in a coarser state than the interior portions. Thus it is easily understood how the separation is effected. Now, the farine de blé and No. 1 gruaux are derived from the interior layers of farinaceous matter; the 2nd gruaux and the gruaux bis are mainly derived from the third layer of which I have spoken, containing a large amount of nutritious matter, but mixed with a certain quantity of the finer particles of bran. In the ordinary methods of manufacture the 2nd gruaux would be re-ground and dressed, and some of the bran particles got rid of. A certain small amount of flour would be thus obtained, but with the bran particles would still remain a very large portion of the farinaceous and nutritious matter. Under the improved process both the 2nd gruaux and the gruaux bis are re-ground, and, by a special arrangement, the principle of which I will describe, the particles of fine bran, formed of the inner skin of which I have spoken, and portions of the "embryonic" membrane, containing the principal part of the "cerealine," are got rid of. M. Mège Mouriès found that the gruaux contained this membrane in two different states, the one adhering, in which case the cells of cerealine are not penetrated by the water of the dough, in consequence of which its action becomes so slight as not to be of any importance; the second, where it is separated, having been torn off in the process of grinding, in which state its action soon affects the whole of the dough.

This latter portion is extremely light, and advantage has been taken of this property to construct a machine, termed an "aspirator," by means of which this portion is got rid of, leaving the other portion, containing valuable nutritive matter, available for mixing with the other parts of the flour, thus adding materially to the produce of the grain.

The machine is of this character. It consists of a horizontal wire sieve, boxed round with a casing of wood, with tiers of shelves over it, so arranged that the current of air, of which I shall presently speak, is conducted over each in turn before it escapes from the machine. This sieve or sifter is agitated by the machinery, and upon this the re-ground gruaux are allowed to fall, and the separation of any larger particles of bran takes place by the ordinary operation of sifting. The finer portions of bran, however, pass through, and the light parts of the embryonic membrane would go through with the flour were it not that whilst this action is going on a current of air from a fan, carefully adjusted, is made to pass upwards through the sieve, and the lighter particles, to which I have alluded, are carried away, and deposited on the shelves. We thus get the valuable portion of the 2nd gruaux and the gruaux bis free from the cerealine in an active state. The produce thus obtained is then mixed with the other flour, and bread is made in the usual way.

M. Mège Mouriès tried an experiment with the small particles thus eliminated. He took flour of the best quality and mixed five per cent. of these particles with it; the result was brown bread. He then took dough made of first quality of flour, and added to it the gruaux blancs and bis deprived of these particles, but still containing three per cent. of bran, and the result was good white bread.

I may add that on examining the flour made on the plan I have described, it was quite possible for a skilled eye to detect a certain yellowish tinge in it as compared with the best white flour, and this, no doubt, was owing to the small portion of fine particles of bran necessarily left in it, but the bread was excellent, both in colour and flavour. The bread made at the establishment is of the same quality as that usually sold by the bakers in the shops for household use.

The saving was stated to me to be at the rate of three centimes on the loaf of 1 kilo in weight.

McCall's Australian Boiled Beef.

The Committee have been favoured with the following report by Dr. A. S. Taylor, F.R.S.:—

The tin of preserved meat sent to me on the 16th November was opened this morning. The contents, consisting of beef partly cooked, were in a good state of preservation. They consisted of lean and fat without bone, mixed with a small quantity of gelatinous liquid. The fat was in larger proportion than I expected to find it. I estimated that it amounted to from one-fourth to one-fifth of the bulk of the solid contents. The greater portion of the fat was in large masses, hard and firm, and of a pale yellowish colour. I should not consider it eatable, and if it was not removed before the meat was further cooked, it would render it oily or greasy and unpalatable to most persons.

The meat when cut was moderately firm, like unsalted boiled beef. It had preserved the reddish brown colour which it acquires by partial cooking, and this colour was uniform throughout its substance. It had the smell and taste of cold stewed beef: there was no smell of decomposing animal matter. It was palatable, and I doubt whether any persons, not informed of its real nature, would have supposed that it had been preserved in a tin for some months. I infer that it has not been overheated in the preserving process. The meat was firmer and had more flavour than a sample which I tasted at Mr. Shaw's last summer. The fibre rendered rapidly of a blue colour a mixture of freshly precipitated resin of guaiacum and autozone, showing that the heat to which it had been exposed had not been sufficient to destroy the red colouring principle of the blood. The gelatinous liquid, like most cooked liquids, had a slightly acid reaction.

A quantity of beef was slightly stewed, and it was found to have the usual taste of stewed beef. Excepting the introduction of so much fat, I believe this to be an improvement on the method of preserving adopted in the early part of the year. The fat requires to be still kept under. It adds weight but not nutriment to the contents of the tin, and, I think, it would only be appreciated by such people as the Lapps or Esquimaux. It should be converted into soup in the colony. If sent over here in such large proportion to the lean, it will not serve as food, but only add to the contents of the cook's grease-pot.—Alfred S. Taylor, M.D., F.R.S.,

13, St. James's-terrace, Regent's-park, Dec. 15th, 1867.

The Committee met on Wednesday, 11th December. Present—Mr. Benjamin Shaw (in the chair), Mr. J. T. Ware, Mr. G. F. Wilson, F.R.S., Mr. Samuel Gurney, M.P., Mr. E. Wilson, Mr. E. W. Hollond, Mr. E. C. Tufnell, and Mr. C. Wren Hoskyns.

Mr. Robert Atkin attended to explain the details of a project for the transport of live cattle from the River Plate to this country.

Mr. Atkin stated that he proposed to construct a steamship capable of carrying a cargo of 1,500 head of cattle, at the cost of £80,000, also four barges, to be used for the embarkation of the cattle, which would enable the whole cargo, when collected together at the port of embarkation, to be shipped in one day. He also proposed to provide a steam-tug to tow the barges. The barges would be so constructed as that when they were brought up alongside the wharf the cattle could walk on board for transhipment to the vessel. The cost of the four barges and the steam-tug he calculated at £20,000. He further proposed the purchase—which could be made at an extremely low price in that country—of 20,000 acres for pasturage of the cattle collected in the country, and the growing of seed and other descriptions of food for their support during the voyage to this country. The land purchase he estimated at £5,000. Mr. Atkin put in the following statement:—

A statement showing the practicability of supplying England with sheep and wholesome food by carrying cattle from the River Plate, in South America, to Milford Haven.

Cost of steam-ship capable of carrrying 1,500 head of cattle	£80,000
Steam-tug and 4 barges, capable of bringing 1,500 head of cattle alongside in one trip	20,000
20,000 acres of land, and implements for producing the food, and preparing the cattle for the sea voyage	10,000
Expenses.	
Insurance on ship £80,000 at 5 per cent.	4,000
Depreciation of value at 10 per cent.	8,000
Wages, at £500 per month	6,000
Provisions for 120 men, at 6s. per week 52 weeks	1,872
Wear and tear, and other expenses	3,000
Coals, 12,000 tons per annum, at 12s. per ton	7,200
Cattle, 1,500, at £2 per head, six trips per annum	18,000
Food for 1,500 head at £1; six trips per annum	9,000
	57,072

RECEIPTS.

Calculating 9,000 head of cattle at £10	£90,000
Deduct for loss 20 per cent.	18,000
	72,000
Deducting all expenses	57,072
Profit	14,928

Upwards of 18 per cent. on £80,000.

As regards the £30,000 invested in land, tug, and barges, it is calculated that cattle can be purchased at £1 per head, and as £27,000 has been charged to the ship, that would leave £18,000 to the land, tug, and barges, for producing food, preparing the cattle, and shipping them. And as the ship has been charged with sufficient coals to steam her out and home, she could save a considerable amount by using her sails, and could supply the tug every voyage. In the meantime, between the trips, the tug and barges could get employment, and earn freight.

An additional profit would be realised by the land in supplying the ship's crew with food of all descriptions, besides sending in the ship extra food for feeding the cattle in England.

Mr. E. WILSON inquired whether the cattle would be shipped in a fattened condition, fit for slaughtering.

Mr. ATKIN replied that the cattle, when brought in, weighed from five to six cwts., and they would then be depastured for some months on the land which it was contemplated to provide for that purpose—the 20,000 acres. The average duration of the voyage would be 21 days. He saw no reason, with the system of stowage that would be provided in the vessel specially constructed for this trade, why the cattle should not be maintained in a fat condition during the voyage. Under the system he proposed he believed cattle could be brought from the districts of the River Plate with less deterioration than was the case with cattle now brought from the northern ports of Europe.

Mr. E. WILSON expressed an opinion, from his practical knowledge of wild animals, that animals taken wild from the plains, and suddenly placed in confinement, would be greatly deteriorated in condition by the voyage to this country, closely packed as they must necessarily be on board ship.

Mr. ATKIN believed that with the complete arrangements that would be provided for ventilation, cleanliness, and feeding, the cattle would suffer very little, if any, in their physical condition. The 1500 head of cattle would be disposed on three decks, and a lower deck would be appropriated to the stowage of water and provisions for the cattle. The food provided would be Indian corn, linseed, and chaff, mixed together. It was equally adapted for sheep. A liberal allowance had been calculated in the expenditure, so as to ensure the best description of fodder. The cost of the cattle abroad would be about £2 per head on board ship, and he valued them at an average of £10 per head in this country, which gave £8 per head for carriage, feeding, and profit. As calculated, the margin of profit to the exporters would be from eight to ten per cent., with the most liberal allowance for expenses of all descriptions. That profit was estimated after making full provision for wages of seamen, &c., and for wear and tear. He also allowed 20 per cent. for losses.

The CHAIRMAN suggested the propriety of an experiment on this system on a small scale, in order to test the practicability of bringing live stock from such a distance and from such a climate in a healthy condition.

Mr. ATKIN said it would not pay to do it on a small scale.

The CHAIRMAN thought the required capital would hardly be subscribed until, by an experiment on a small scale, it was shown that the thing was practicable. He inquired whether Mr. Atkin saw any probability of doing that?

Mr. ATKIN replied—No doubt it would be the best plan, but on a small scale it would not pay. He added that he had no results to lay before the committee of an actual experiment of importing live cattle from the River Plate; but live stock had been taken there from this country. In carrying so large a number of beasts as he proposed there must necessarily be close stowage of the animals. He proposed to swing them as soon as they got on board, but not so as to take them off their feet. It would merely serve to steady them, and keep them from falling when the vessel rolled. He had had no personal experience in the treatment of wild cattle under the circumstances proposed. He saw no reason why the condition of the animals should not be improved during the voyage, looking to the superior description of food that would be given them, and the means of ventilation and thorough cleanliness that would be adopted.

Mr. E. W. HOLLOND remarked that, in the passage from the Plate there were only three or four days of very hot weather. With a steamer the tropical heat would be passed through in a shorter period than that. He agreed with Mr. Wilson that the great difficulty was in dealing with the cattle fresh from the Pampas.

The CHAIRMAN said it was obvious that cattle taken from their wild state would require to undergo a process of feeding to bring them into a condition fit for meat to be consumed in this country; and some time would be required to get them accustomed to the artificial food with which they must be supplied on the passage to England.

Mr. ATKIN said a portion of the 20,000 acres would be appropriated to the cultivation of seed foods, and the cattle would be gradually brought to the change of food previous to their being shipped. On the subject of the stowage of the cattle in the vessel, Mr. Atkin stated the animals would be ranged heads together, for the convenience of feeding.

Mr. E. W. HOLLOND inquired whether Mr. Atkin had received any opinions as to the practicability of his plan from the stock collectors and others of Buenos Ayres, &c.

Mr. ATKIN replied that he received communications from various consulates, and also from Mr. Neale, of Monte Video. The price at which the cattle could be shipped he had obtained from the captains of vessels trading to those ports. Mr. Atkin thought, after the twenty-one days' voyage the animals would not be very wild, and there would be a surplus of food to which they would have been accustomed on the passage on which they could be fed for some time after their disembarkation. He repeated his opinion that the animals would improve in condition during the voyage. He had never lost any live cattle that he had taken to sea with him in ships he had commanded.

Mr. WREN HOSKYNS remarked that, as a rule, cattle sulked and refused food after being deprived of their liberty.

Mr. ATKIN said he had carried similar cattle from Wellington to Auckland without any difficulty, but not on the large scale that was now proposed. Being swung he thought the cattle would not be injured, as a portion of their weight would be upon their legs. It would ease them and tend to keep them quiet. The capacity of the vessel would be 6,000 tons; she would carry a crew of 120 men, and the speed under steam and canvas was calculated at twenty knots per hour; under steam alone, which would be used only as auxiliary in passing through calms, the speed would be fourteen knots. Advantage would be taken of the north-east trades to save the fuel, of which the stock must be sufficient for the outward and homeward voyages. Steam-power would therefore only be auxiliary.

On the subject of the transport of horses from Australia to India, it was mentioned that the number conveyed in one vessel did not exceed 50 or 100.

The CHAIRMAN said he understood that Mr. Atkin had some communication to make to the committee with regard to increased supplies of fish.

Mr. Atkin said, with regard to this subject he proposed to build a class of vessels of about 150 tons, fitted with wells, to keep the fish alive, with steam-power adequate both for working side-screw propellers and for lifting the trawl net. The trawl itself would be much larger than any now in use worked by manual labour, and by that means larger quantities of fish would be taken from deeper water than was now fished, and from which the best fish were obtained. He thought the great object would be to ensure certainty of a large supply of fish. The class of fishing vessels he proposed would be able to keep at sea in all weathers, and the fish would be kept alive till they were landed. He had fished with a trawl in 100 fathoms of water. He considered the fishing vessels at present used were too small, as well as the trawls which they used. He was well acquainted with the fisheries of the North Sea and the Baltic, as well as on the coasts of India and China, and he considered the Chinese left us in the shade entirely in their fisheries, both in the rivers and in the sea. The present small fishing vessels had not power to drag such a trawl as would ensure much larger catches of fish from deeper waters. The nets he proposed would be stronger as well as larger than those ordinarily employed. Mr. Atkin expressed his opinion that, by means of this enlarged scale of operations, great additions might be made to the supply of oysters from beds at present inaccessible. The English and French oyster fishermen dredged only to a depth of about 30 fathoms, but no doubt much larger supplies might be obtained from beds which would be found in deeper water. He proposed that dredging should be carried on upon a larger scale, and employing larger dredges to be worked by steam power, which could also be applied to the working of a side screw as auxiliary propulsion of the vessel. He believed that large oyster beds existed on the Dogger Bank. As oysters were now selling in London at 2d. each, it would be worth while to increase the supply and reduce the price. He proposed to adopt the plan which was carried out in America—viz., when any large supply of oysters was obtained, to take the fish out of the shells and pack them in cases. In New York, oysters treated in that way were sold at 4d. per lb., which was remarkably cheap compared with the price charged in this country.

Proceedings of Institutions.

Science Classes, Royal Arsenal, Woolwich.—The 5th annual distribution of prizes and certificates, awarded by the Society of Arts, and by the Science and Art Department, South Kensington, to the successful students of the Royal Arsenal Science Classes, on the results of examinations held in May last, were distributed in the lecture-hall of the Arsenal Mechanics' Institute, on Thursday evening, the 21st November, by John Anderson, Esq., president of the institute and of the committee or local board, the members of the board present being Messrs. Oram, Baker, Davidson, McGrath, and W. D. Keeble, the secretary. Before proceeding to distribute the prizes, Mr. Anderson delivered a very lucid and stirring address to the students and friends present. He spoke of the advantages offered by the Science and Art Department, and the Society of Arts, to the youth of our day, throughout the United Kingdom of Great Britain and Ireland, and urged the necessity of a larger amount of technical education amongst all classes of artisans, and especially engineers, if England were to retain her hitherto exalted position among the other nations of the world—remarking that this education should be so general as to prevent its recipients feeling themselves above the labour of the workshop. Mr. Anderson then gave a very interesting and instructive account of the machinery department of the Paris Exhibition, remarking, with much regret, that our own country had not made such progress in this department during the last few years as had been made by other countries, with which England compared so well in 1851. By way of illustrating this, he stated that two very large contracts for locomotive engines, &c., amounting, respectively, to £160,000 and £325,000, recently tendered for by several European countries, both went from England—the one to France, the other to Austria, and this, apparently, through England's inability to compete with those powers. The president then stated that such exhibitions as the Paris one might be considered to bear a somewhat similar relationship to nations as the science class examinations all over the kingdom bore to the students, and although he had to speak in somewhat unfavourable terms of England in some branches of engineering at the Exhibition, he was pleased to find that, coming nearer our own homes, and in the matter of these science examinations, the Royal Arsenal classes showed such favourable results, as set forth in some statistical tables prepared by Mr. W. D. Keeble, the secretary. A vote of thanks was then given to Mr. Jones, F.R.A.S., the principal of these classes, for his highly satisfactory conduct of them during the past year. Mr. Jones, in reply, said, in addition to his thanking the meeting for its kind expression of thanks to him, he felt much indebted to Mr. Anderson for his excellent address, which was likely to produce a very wholesome effect upon those for whom it was intended. In acknowledging a unanimous vote of thanks to the committee, Mr. Oram said that he wished Mr. Anderson's very excellent address could have been heard throughout the length and breadth of the land, as he (Mr. Oram) believed it would have a very salutary effect amongst young engineers and artisans generally, in improving their condition as educated, skilful, and promising workmen; and he hoped that England would soon regain the position which she had so long enjoyed in engineering and other branches of industry. This concluded, perhaps, the most interesting and instructive meeting that has ever been held in connection with these classes since their commencement, in 1862.

EAST LONDON MUSEUM OF SCIENCE AND ART SITE BILL.

Mr. Antonio Brady, a member of the Council, has recently issued the following letter, relating to the Bethnal-green Museum, to promote which the Council has voted a sum of £100 :—

Sir,—As one of the promoters of the above bill for securing to the artisans of London (who mostly reside at the East-end) the blessing of industrial and art education, permit me, through your columns, to call Lord Redesdale's attention to one of the many misapprehensions into which he has inadvertently fallen, and thus unhappily deferred, we will hope only for a short time, the realisation of this great scheme, which, fostered by the far-seeing wisdom of the Government, I had hoped was on the point of being accomplished. I still trust that as soon as Parliament re-assembles this bill may be passed, so that our artisans may in future be in a position to compete with foreign nations on more equal terms than at present. While foreign nations possess better means of art education our workmen are at a great disadvantage in the race of free trade.

The proposed museum is no local affair, but designed as a national establishment, to give means of utilising some of the treasures now stowed away in cellars for want of space to exhibit them.

Lord Redesdale takes exception to the Bill, "that it does not provide as to who the trustees of the museum are to be;" and adds, "Was Parliament to give powers of purchase to a trust not yet formed?" This is the point on which I submit his lordship is mistaken, as I will try to explain. The facts are simply these:—The three gentlemen named in the Bill offered to raise funds to pay for the site in question if it was acceptable to the Government. This was in the time of the late administration, so it is no party question; and Lord Granville, then Lord President, accepted the offer, and a report was made to Parliament recommending the scheme. This report, and the correspondence relating to it, will be found in the 13th Report of the Science and Art Department. The ministry was changed, and the scheme slept, until, on the part of myself and colleagues interested in this matter, I had the honour of renewing the offer to the present Government. After very full inquiry and mature deliberation, the Cabinet approved the plan, and Parliament voted the necessary funds. On our part, we submitted to the Government the agreement for the purchase of the land, which we had conditionally entered into with the trustees. This draft having been approved by the Government, a regular deed, under seal, was executed by every person interested in the matter, and the local papers have been warm in its praise. No Government ever did a more popular or a more gracious thing for the million at the East-end.

Counsel, however, at the last moment, raised some legal and technical objections to the title, which it was thought could best be remedied by a short Bill, which was prepared accordingly by Mr. Reilly.

The Bill recites that the three gentlemen named in it may purchase, but only for the purposes named in the deed of purchase, and that the trustees may sell, but only in order that the land may be handed over to the Government for the purposes of the intended museum.

Now what Lord Redesdale seems to have overlooked is the fact, that, by Royal Charter, bearing date the 30th of April, in the 27th year of Her Majesty's reign:—

"The Lord President of the Most Honourable Privy Council for the time being, and the Vice-President of the Committee on Education of the Most Honourable Privy Council, also of the time being, shall be a body corporate, under the name of the Department of Science and Art, having a perpetual succession and a common seal, with a capacity in that name to sue and be sued, make contracts, purchase, take, hold, and enjoy for the purposes of science and art, as well goods and chattels, 'as lands and hereditaments,' not exceeding fifty acres, without license in mortmain. And the said charter of incorporations further grants unto the said Department of Science and Art full licence and authority, for the furtherance of science and art, to accept any trust, whether subject or not to special conditions, &c., &c."

Now all that the proposed act is intended to do is to enable the three gentlemen named in the Bill to make over this land to the Science and Art Department for the purposes named.

The proper office, I have reason to believe, certified that the promoters of this Bill (myself and others) had complied with the standing orders as to notices to the public; and the only reason that we or the Government had for pressing this Bill forward was the hope of providing labour during the coming winter for many deserving poor, now, unhappily, out of work; a reason which, I feel sure, would commend itself to the heart, not only of Lord Redesdale, but of every other person interested in this great work. The other matters referred to in his lordship's speech will probably be replied to on the re-assembling of the House, and, in the meantime, the great cause of industrial and art education will, I trust, be advanced by the discussion to which the grave matters involved in this movement for the benefit of our working classes is sure to give rise.—I have the honour to be your obedient servant,

ANTONIO BRADY,
One of the Promoters of the Bill.

Maryland Point, Stratford, December 14, 1867.

UTILIZATION OF SEWAGE.

An experiment of some importance is now being carried on at Asnières, near Paris, on a field of about two acres and a-half in extent, and situated about 300 yards distance from the mouth of the great *egout collecteur.* Two portable engines are employed daily in pumping 500 cubic mètres of sewage-water into a receptacle at one end of the field. A part of this water is applied to various crops—vegetable and cereal—and the remainder is treated with chemical agents for its purification. The former application is considered as fully confirming the opinion that sewage-water may be advantageously applied either to crops or to the direct fertilisation of the soil itself, without communicating any bad taste to the vegetable products, or in any way vitiating the surrounding atmosphere. Some fine specimens of beetroot, yellow turnips, artichokes, and other vegetables thus irrigated were shown at the late exhibition on the Champ de Mars. These products were grown at Clichy, but they were not accompanied by sufficient data to render them scientifically and practically useful, and therefore the authorities of the city of Paris have set on foot the experiments already referred to, in order to obtain definite results connected with this important question. It is the expressed opinion of M. Le Chatelier, a mining engineer engaged in the experiments of purification of the sewage, that the cultivated lands around Paris can never absorb a considerable portion of the sewage water; one difficulty arises from the cutting up of the land into small allotments, which increases the cost of distribution; a second from the fact that the principal arable lands lie on high plateaux, whose slopes lie often in directions contrary to that of the streams; and, lastly, the distance from the sea removes the possibility of getting rid of the excess of water in that direction.

As regards the purification of sewage water, M. Le Chatelier considers sulphate of alumina as the most effective agent. He says that by employing, in small doses, ferruginous sulphate of alumina, obtained by treating *bauxite,* a common mineral found in the south of France, with sulphuric acid, or by washing the ashes of the Picardy alum works, the water of the sewers may be purified almost completely, and in a relatively short time. The quantity of sulphate of alumina required is stated to be between 100 and 200 grammes (one-fifth to two-fifths of a lb.) per cubic mètre of the sewage water to be purified. The average amount of impurities per cubic mètre in the sewage water of Paris, is found to be as follows:—

	Kilogrammes.
Mineral matter	1·902
Organic ,,	0·599
Soda	0·103
Potash	0·022
Phosphoric acid	0·012
Azote	0·033
Total	2·671

They contain in solution carbonates of ammonia, lime, and magnesia, as well as small quantities of sulphate of ammonia, and earthy and metallic salts. A precipitate of alumina and aluminate is thrown down, which also encloses light matters in suspension in the water; oxide of iron is likewise precipitated, and, completely neutralising the sulphuretted hydrogen, assists the deposition. Thus we have at the same time decolorisation, clarification, and disinfection.

The experiments which have been made are not, however, deemed conclusive, and a fresh series are now under hand in a smaller reservoir, which has a surface of about 250 square mètres, and receives 50 cubic mètres of sewage water per hour; the water, after four hours' treatment, is said to pass off through a filtering medium in a very satisfactory condition. There remains, however, the economical question. This process of purification would require basins of many acres in extent, besides the erection of pumps and steam engines, in addition to the still heavier expenditure for the chemical agent employed. The cost of the sulphate of alumina is between one and two centimes per cubic mètre of sewage water, so that the quantity required to purify 200,000 cubic mètres per day would cost between £80 and £160.

The remaining question is whether the matter precipitated would find a market as manure; but the amount of the chemical agent employed would alone give this precipitate a minimum value of four shillings per cubic mètre, while the supply from 200,000 cubic mètres of sewage water alone would be no less than 400 cubic mètres per diem; and when it is remembered, moreover, that this manure would contain 72 per cent. of inert mineral matter, against 25 per cent. of organic matter and 0·75 per cent. of azote, it seems very doubtful whether a market could be found for such a product.

There is no question of the immense importance of the subject, and it is to be hoped that the experiments now being made will at any rate assist in bringing about some advantageous application of such precipitated matter, and thus prevent the pollution of rivers and the extermination of the fish which inhabit them. The Seine at Paris is now relieved of the sewage water of the metropolis, which is thrown into it below the city, but, on the other hand, it still receives the impurities which are poured into it by all the sewers between Paris and the source of the river.

Fine Arts.

A Picture by Sir Thomas Lawrence placed in the Louvre.—It has often been remarked that no pictures of the English school are to be found in the Louvre, and, in truth, the Great Gallery contains only one work, a picture of dead game, by an Englishman, if we except Bonnington, who is generally classed with the French school. The picture by Sir Thomas Lawrence, just acquired, is a portrait of Madame Ducrest de Villeneuve, wife of the Rear-Admiral of that name.

Modern French Pictures.—The famous picture of Ingres, "La Source," which was seen in London at the Universal Exhibition of 1862, forms part of the collection of the Comte Duchâtel, which is about to be dispersed by the auctioneer. The sum which the painter received for this work is said to have been £4,000, and it is expected to fetch a much higher price at the coming sale. The well-known picture by Ingres, "The Odalisque," was purchased by the late Comte de Portalis for £480, and was resold not long since for £2,000. The "Napoleon" (1814), by M. Meissonnier, which was to be seen the other day at the Champ de Mars, was recently sold for £4,000; and it is said that the same artist has received a commission for a companion picture at the price of £6,000.

Manufactures.

The Manufacture of Candles in Italy.—The manufacture of tallow candles, at one time very considerable in Italy, has lost a great deal of its importance since the introduction of stearine candles, and more especially of lighting by gas. In Piedmont and Liguria the number of manufactories of tallow candles is 202, employing about 280 persons, and producing 570,000 kils. (1,254,000 lbs.) per annum. In the province of Milan, in Lombardy, there are 12 manufactories, working about 600,000 kils. (1,320,000 lbs.) of raw tallow every year, and their annual produce may be estimated at 1,200,000 frs. (£48,000). From 50 to 60 workmen are employed, whose wages average from 1·20 to 2·50 frs. per day. In the Romagna, the Marches, and Umbria there are 11 manufactories, producing yearly to the amount of 320,000 frs. (£12,800). Tuscany exports annually 450,000 kils. (990,000 lbs.), and the Neapolitan provinces, 847,000 kils. (763,400 lbs.) of tallow. The manufactory of stearine candles of Messrs. Lanza, of Turin, employs from 100 to 150 workmen, and 970,000 kils. of tallow, of which about half is imported from abroad. It produces about 800,000 packets of candles, weighing half a kilo. There is also another manufactory of some importance at Turin. M. Manganoni, of Milan, manufactures 9,000 kils. of stearine candles, amounting to the value of 1,080,000 frs. per annum. These candles are sold retail at 2·85 frs. per kilo. At Mira, near Venice, there is a manufactory employing 90 men and 70 women, producing about 160,000 lbs. of candles per annum, which are in great part exported to Brazil and the Antilles. In Tuscany, at Leghorn and Pisa, about 800,000 kilos. (1,760,000 lbs.) of stearine candles are produced yearly. The candles made at Naples are sold at 2·70 per kilo. The following shows the value of the imports of stearine candles in Italy:—

	Quantity. Kils.		Value in Frs.
1863 ..	484,600	..	1,425,000
1864 ..	497,600	..	1,468,000
1865 ..	446,700	..	1,317,000
Average kil. ..	476,300	.. Frs.	1,403,000
Lbs.	1,047,860	.. £ ..	56,120

Manufacture of Small Arms in Italy.—In Italy there are three manufactories of small and side arms belonging to the Government—at Brescia, Turin, and Torre Annunziata; there is also a workshop for the repairing of small arms in the arsenal at Genoa. None of these factories are worked by steam, but they possess a water power of 234 horses. The number of workmen, both civil and military, amounts to 1,460. The wages of the former average from 1 to 3 frs. per day, although some earn as much as from 5 to 7 frs. The military workmen receive from 60 to 70 centimes per day. The quantity of iron and steel used is 2,207 quintals (220 tons), of the value of 190,000 frs. per annum; 209 quintals (20 tons) of copper and gun-metal, amounting to 26,000 frs. The wood used for making the stocks costs 75,000 frs. Thus the raw material employed annually in the three factories amounts to 586,000 frs. (£23,440). The following are the principal annual productions of the three manufactories:—

	No.		Value. Frs.
Guns (new)	18,259	..	671,000
„ (repaired) ..	125,129	..	354,000
Swords (new) ..	49,000	..	443,000
„ (repaired) .	15,427	..	25,000
Bayonets (new) ..	3,672	..	20,000
Scabbards for ditto	60,000	..	94,000
Tools (such as nipple, wrench, &c.)	10,000	..	45,000

Besides these, the furniture and other accessories of 60,000 guns, valued at 308,000 frs., must be added, which forms a total value of 1,960,000 frs. The cost of labour was 920,000 frs., and the annual consumption of fuel may be estimated at 114,000 frs. Amongst the branch factories, there is the foundry at Mongiana, in Calabria, and of San Giovanni, at Teduccio. The first is worked by two steam-engines and seven water-wheels, amounting to 116 horse-power, and employing 1,126 workmen. It produces annually:—

			Value.
Hollow and solid shot ..	No. ..	4,902 ..	103,500
Soft iron	Quint.*..	740 ..	32,000
Bars for gun barrels	No. ..	1,465 ..	4,500
Furniture	Quint. ..	72 ..	8,600
Gun barrels	No. ..	800 ..	27,000

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* Quintal: 1 cwt. 3 qrs. 24½ lbs.

The total value of the products of the various branch establishments amounts to 330,000 frs., and the raw materials employed cost 227,000 frs. At the establishment of San Giovanni, at Teduccio, they make locomotives and machinery for coining. The war materials manufactured are chiefly bullets, grenades, and other projectiles; cost, 234,000 frs. The rifling of cannons is estimated at 158,000 frs. The introduction of rifled arms in the Italian army, and for the national guard, has caused during the last few years a great importation of foreign guns, especially from the well-known establishment at St. Etienne, in France, and from Switzerland. From 1861 to 1865 inclusively, the following are the imports of fire and side-arms:—

	No.	Value.
Gun barrels	155,949 ..	2,689,000
Pistol barrels.. ..	53,709 ..	433,000
Guns for regulation	863,491 ..	23,411,000
„ sporting..	17,631 ..	615,000
Sword blades.. ..	—— ..	340,000

With the exception of a small quantity sent to Turkey, the exports of firearms are of little importance. During the same period (1861 to 1865) 25,829 regulation guns, 736 sporting guns, 37,700 pistol barrels, and 3,665 gun barrels, amounting in all to the value of 1,270,000 frs. (£50,800), were exported.

Commerce.

The Railways and Telegraphs of the World.—In 1866 the total length of railways opened for public traffic throughout the whole world amounted to 87,578 English miles, and are divided amongst the various nations as follows:—

	Miles.
United States of America	32,742
Great Britain and Ireland.. ..	13,476
Germany (including Austria) ..	13,392
France	9,142
India..	3,434
Italy	3,284
Spain	3,161
Russia	2,815
Canada	1,968
Belgium	1,618
Sweden	1,040
Switzerland	795
Holland	711
	87,578

The cost of the 13,476 miles of the English railways up to the present time amounts to £455,000,000, whilst the 13,392 miles of railway in Germany cost only £96,750,000. The 9,142 miles of railway in France cost £280,000,000. The total length of telegraphic lines throughout the world is upwards of 178,056 English miles, consisting, on the average, of a triple line of wires. The following is the length of lines in the various countries, according to the latest returns:—

		English miles.
1866.	Germany	28,347
1866.	Russia	22,992
1866.	France	18,694
1866.	Great Britain and Ireland..	16,297
1866.	Turkey	8,665
1863.	Italy	8,216
1865.	Sweden	3,507
1861.	Belgium	1,089
1866.	Switzerland	2,160
1865.	United States of America ..	52,957
1865.	Canada	5,050
		167,974

To this must be added the two Atlantic cables, the total engths of which are about 4,317 English miles (3,754 nautical miles), and the total length of the other submarine cables amounts to near 5,765 miles.

Colonies.

The Land System in South Australia.—A colonial paper says that the time has really arrived for a complete change in the principle upon which the public lands of this colony are sold. Hitherto the law has provided that those lands shall be sold to the highest bidder, no matter what use he may intend to make of them. The state may know that he is a mere speculator; that he has no intention of settling upon the public lands; and that his sole object is to sell them again, when he may wring a larger price from the hands of the man who really does wish to settle upon them, but who is unable by any means in his power to get the farm which the Government auctioneer is offering, without either bribing the speculator first, or paying him an advanced price afterwards. In fact, the principle of the present system is this—that land is £1 per acre, and that the farmer shall have it at that price if nobody else wants to pay more. But practice shows that somebody else always does want to pay more whenever the unfortunate agriculturist makes a bid, and the result is that he is virtually driven from the auction-room, which is therefore abandoned to the agents and speculators. The returns show that the average auction price of country land has ranged from £1 3s. per acre in 1860, to £1 14s. 5d. in 1865; whilst the average price of all lands—including town and suburban—has during the last ten years not been more than £1 5s. 11½d. per acre. The whole of the difference, then, between the auction-price of country sections and the price which the farmer pays must find its way into the pockets of the speculators, who thus drive a thriving trade upon the necessities of those who ought to be able to obtain their farms at £1 per acre direct from the Government.

Land Laws in South Australia.—The returns which have been laid on the table of the Assembly concerning the migration of settlers to the other colonies seem to be conclusive as to the existence of some discontent at the state of the land laws in this colony. It appears that the Government sent the following questions to sixty District Councils:—" 1. Are you aware of any farmers having left or being about to leave your district during the present year with the intention of settling in New South Wales or Victoria? 2. Were they tenant-farmers or freeholders? 3. Of what nationality? 4. Can you assign any reason for their leaving?" The result of the sixty circulars sent out is as follows:—Eleven District Councils have replied that some settlers have left, and that others are about to follow; thirty-eight have replied that they are not aware of any departures; one has replied that two families have come from Wentworth to reside in the district; and the remaining ten have not replied at all. Judging, then, from the comparatively small number of districts that have complained of migrations, the "exodus" would seem to be a trifling matter. But when the particulars are looked into it will be seen that the class of people who have left are those which the colony can ill-afford to spare, and that altogether they number some 74 families.

Obituary.

Duc de Luynes and de Chevreuse.—The late duke was said to be the richest of all the old nobility of France, as he was certainly the most munificent patron of the arts. His Château of Dampierre, not far from Versailles, one of the most famous show-houses in the country, contains a fine collection of paintings, sculpture, and works of art and *vertu* of all kinds; and his collection of medals and antiquities, presented to the nation some time since, forms a special department of the Bibliothèque Imperiale of Paris. Every intellectual labour found a patron in the late duke; he aided greatly in the restoration of the art of glass-staining; he gave a sum equal to a thousand pounds to anyone who invented a new process in photography, and threw it open to the world; when a famous medal was stolen from the old collection of the Bibliothèque Imperiale the duke took great trouble to find a similar one, purchased it for the sum of seventy-two pounds, and presented it to the director, M. Naudet, saying that a public collection had greater claims than a private one; a large number of splendid books owe their appearance to his munificent aid; the Château of Dampierre is surrounded by admirable roads, all made at his own and his father's expense; one of these is thirty leagues in length; he made more than one excursion in the East for scientific purposes, and aided many other explorers; and he was himself a distinguished artist, writer, and connoisseur, but so retiring that he could never speak in the chamber. When the late troubles broke out in Rome, his son and his nephew joined the pontifical army as volunteers, and the duke tended the sick, and died, at the age of 65, through a cold caught by giving his cloak to a wounded soldier.

THEODORE ROUSSEAU, one of the most celebrated landscape painters in France, and a constant exhibitor. He had suffered sadly for several months, and died recently at his house, at Barbizou, on the skirts of the forest of Fontainebleau, whence he drew his inspiration. By his will, all the works remaining in his possession are to be collected and photographed, and, if circumstances permit, they are to be published in a collected form, after the manner of the "Livre de Verité" of Claude Lorraine, or of the "Liber Studiorum" of Turner. M. Rousseau was only fifty-five years of age.

M. J. P. FLOURENS, professor of comparative physiology at the Museum of the Jardin des Plantes of Paris, where he succeeded Cuvier in 1830, perpetual secretary of the Academy of Sciences, member of the Académie Française, and of the principal scientific societies of Europe; author of "De la Vie et de l'Intelligence," "De la Longévité Humaine," "Théorie Expérimentale de la Formation des Os," and many other works. The deceased was born in 1794.

Notes.

SCHOLASTIC REGISTRATION ASSOCIATION.—The annual general meeting of this association, open to educators and persons interested in education, will be held on Wednesday, 8th January, at eight o'clock p.m., at the house of the Society of Arts, John-street, Adelphi, London, W.C., by permission of the Council. The Rev. William Haig-Brown, LL.D., F.C.P., Master of Charterhouse, will preside, and the honorary secretary will give a statement of the objects, constitution, and operations of the association. Several questions of the highest importance will be introduced for discussion, and it is earnestly hoped that all who are interested in the advancement of education and the prosperity of the profession, will attend and take part in the proceedings. The following will be the principal resolutions:—"That education is entitled, as much as medicine, divinity, or law, to be regarded as a distinct profession, and that liberal culture and special training are as much required by the educator as by the physician, the lawyer, or the divine." "That a Scholastic Registration Act, by giving to educators a legally recognised position, would tend to increase their efficiency, and, by discouraging unqualified persons from engaging in the business of teaching, would gradually raise the standard of education throughout the country." "That as the need of special training for teachers of both sexes is now practically recognised in the case of schools for the poorer classes, a similar provision ought, *à fortiori*, to be made for teachers in schools of the middle and upper classes, involving as these do a greater variety of subjects, and a greater depth and breadth of instruction."

NEWSPAPERS IN ROUMANIA.—There are now about twenty daily newspapers in Roumania. They have but a limited circulation. The *Monitordl*, the official organ, has only a circulation of 4,000 per day; the daily circulation of all the others put together does not amount to more than 10,000 copies. The organ of the reds is the *Roumainl;* that of the conservatives the *Independenza Romana*, which is printed in the Roumanian and German languages There is also a German lithographic sheet, the *Rouman Correspondence*, the anti-Jewish *Trompetta*, the *Gazzetta de Jassy;* and the *Moldavia*, the organ of Moldavian separatists. Of these the first four are published at Bucharest, and the others at Jassy There are also several local journals,—two published at Jassy, four at Bucharest, three at Galatz, and one in each of the district capitals.

EFFECT OF THE LATE STORM ON THE CHAMP DE MARS.—The storm which swept over Paris a fortnight since is found to have caused destruction to the extent of more than four thousand pounds in the reserved garden attached to the late Exhibition. The roof and a portion of the side of the great conservatory were torn off, and nearly the whole of the fine palms and other tropical plants cut to pieces. The roof of the restaurant was also carried away, two sheds and a large corrugated iron roof destroyed, and a small glass-house entirely destroyed by the falling materials.

THE CALAIS LIFE BOAT.—It will be remembered that the fine life-boat exhibited by the Royal Life-Boat Society, at the late Paris exhibition, was presented to the sister society of France, with a recommendation that it should be stationed at Calais, where many shipwrecks of English vessels had occurred. On the second of last month (December), this boat was first called into use during a terrific storm, when it was the means of saving the lives of six sailors from the wreck of an English brig. A good action does not always bear fruit so soon.

COLONISATION IN THE CAUCASUS.—The Russian journal *Moskowa* states that the Government intends to try the experiment in the spring of establishing Czech colonies in the Black Sea districts. Land in the Caucasus is to be offered gratis to Czech settlers; but they are not to be allowed to sell any portion of their land for the first ten years of their stay. The Government will also lend them money for farming purposes, and to enable them to build schools and other public establishments.

LOAN FOR THE CITY OF PARIS.—The authorities of the City of Paris have, it is said, arranged with the society of the Crédit Foncier for a loan of 380 millions of francs (£15,200,000), with a view of making certain reductions in the octroi duties on coal and other raw materials which press very heavily upon the factories in the outskirts of the town, and have caused many to be closed. The society is to find the necessary funds during the next ten years, and the city is to repay the loan in fifty years. This arrangement will give the city of Paris a balance in hand of one million sterling per annum to cover the loss caused by a diminution of the duties in question. Amongst other changes the octroi duty on wine, it is expected, will be reduced to half its present rate. The state, being in receipt of a certain per centage of the octroi duties, will bear its proportion of the cost of the arrangement, which will be carried out partly by Imperial degree and partly by a legislative act. The duties in question fall very heavily on the poorer portion of the community as well as the manufacturers, and their reduction will be one of the most popular measures ever effected; it is unfortunate, however, from the nature of the duties, or rather from their mode of collection by officers stationed at all the barriers of the metropolis, that the diminution of the amount of the duties increases, *pro rata*, the expenses of collection.

Introduction of Telegraphic Dispatch Stamps in France.—This important change, which has already been noticed in the *Journal*, came into operation on the first day of the new year. There are four kinds of stamps prepared, of the respective values of 25 and 50 centimes, and one and two francs each, the colours being carmine, green, chamois, and violet. Generally, prepayment by these stamps will be obligatory. Stamped dispatches may either be deposited in the boxes prepared for the purpose, or handed to the clerks at the post offices, who will give receipts for them. When the price of the dispatch exceeds ten francs for France, or twenty francs for abroad, payment is to be made in cash. If the stamp is lower in amount than it should be, the difference, with a fine of fivepence added, will be demanded of the person to whom it is addressed, and on his refusal to pay, it will go to the dead office. But this only applies to France; no telegram will be sent abroad if not fully stamped. The cover containing the dispatch must be stamped in the ordinary way like a letter.

Direct Paris and Hamburg Railway.—A new line of railway, of great importance to the north and west of Germany, has just been conceded by the Prussian Government, after a previous understanding with the authorities of Hamburg, Bremen, Oldenburg, and the company owning the line from Cologne to Minden. This new undertaking, which is chiefly known as the "Direct Paris and Hamburgh Railway," will start from the latter place, and pass by way of Bremen and Osnabruck to Cologne. By uniting the three great ports of Germany, Kiel, Hamburg, and Bremen, with the coal districts of Westphalia, of which the town of Dortmund is almost the centre, it will allow German coal to be brought direct to those towns. The cost of carriage will be but small, and the produce of the mines will find a ready market on the coasts of the North Sea and Baltic; it will, moreover, furnish a new element of freight to the shipping of Bremen, as the German vessels trading to India and China, finding within reach the Westphalian coal, will carry it to those distant countries, where supplies of fuel form one of the most productive resources for merchant shipping. These results, if not as certain as accomplished facts, are, at least, highly probable. Although the line of railway is not definitively traced out, the works will be commenced immediately, and there are hopes that the whole will be terminated in less than five years.

Production of Amber.—The little fishing village of Schwarzort, situated on the shores of the Baltic, between Memel and Dantzic, about two leagues to the south of the former place, has within the last three years acquired a certain importance, owing to the discovery of a large bed of amber. This bed is situated near the Cape Korning, and is believed to be extensive. Four steam dredgers are employed for the collection of the amber, as well as a considerable number of dredgers worked by hand. The amber is found almost uniformly in separate nodules, with lignite disseminated in the sands at a depth of from ten to twelve feet. The dredging is carried on day and night, by shifts of eight hours each. About 400 persons are employed at this work, and their wages are on the average 22 silver groschen (2s. 2d.) per shift. The quantity of amber collected is considerable, amounting to about 288 lbs. per shift, and for six days' work 5,184 lbs. The sand, after being dredged up, is sent on shore, when it is washed in order to find the amber.

Correspondence.

SCIENCE CLASSES.

Sir,—At our last educational conference I directed attention to the failure of science classes in Yorkshire. Since then, my attention has been constantly directed to the subject of technical education, but I should not have troubled you with any communication thereupon at the present time had not a "comparative statement, showing the present state of scientific instruction in Lancashire and Yorkshire," been published in the *Journal*. At the conference I gave utterance to my conviction, that before any satisfactory results can be gained in science classes, primary education must be more widely extended, and the quality thereof considerably improved. I further affirmed that the present science class scheme of the Department is a miserable failure, as regards its present influence upon technical education. I substantiated my statements by official statistics, proving that although there was a yearly increase in the total number of science pupils, yet this increase was mainly due to the establishment of new classes, and not to a healthy increase of pupils in classes already established. I also pointed out the meagre results of the teaching in science classes. By a glance at the report of the Department it will be seen, that in the majority of classes established in 1866 there was a decrease of pupils in 1867. As regards the results of instruction, a pleasing delusion is given by the total number of pupils under instruction, the number of papers worked at the examination, amount paid to teachers, and sums awarded in prizes. But let the totals be analysed, the subjects of instruction specified, and the centres of industry noted in which the results are gained, and the delusion will give place to the conviction that, notwithstanding all Departmental advocacy, the present science classes are exerting but the smallest influence upon the technical education of the community. As Lancashire has been brought to the front, I am quite willing to take my stand upon the results gained in that county, and by noticing the progress of its science classes, and the results produced, as certified by the examinations of the Department, to substantiate my assertions.

By reference to the last "Science Directory," it will be seen that out of 47 schools enumerated in the "comparative statement," only 33 are returned in the report of the Department for 1866. Of these 33 schools 18 had a less number under instruction in 1867 than in 1866.

	1866.	1867.
Accrington	23	21
Blackburn Mechanics' Institute	20	16
Bolton, Bridge-street	65	60
,, Independent School	34	13
,, Mechanics' Institute	95	79
Burnley Literary Institute	70	55
,, Westgate	20	12
,, Mechanics' Institute	60	48
Clitheroe	30	12
Droylsden	69	37
Haslingden	29	19
Manchester Mechanics' Institute	388	239
,, Corporation-street	42	36
Nelson-in-Marsden	36	27
Newton Heath	16	12
St. Helen's	22	19
Salford	53	44
Wigan	30	23

In four the numbers were stationary :—

Ashton-under-Lyne	20	20
Burnley Grammar School	50	50
Oldham Science and Art School	100	100
Pendleton	17	17

and in the remaining 11 there was an increase:—

Bacup	38	51
Blackburn	11	13
Bolton Science and Art School	31	168
Burnley Carlton School	62	69
Bury	60	72
Heywood	23	32
Liverpool	28	68
Manchester Society	13	31
Middleton	17	22
Oldham Analytical Society	13	14
Preston	23	37

So the result of one year's indefatigable exertions of the local administrators, upon classes in existence in the previous year, is seen in a diminution of pupils in 18 schools out of a total of 33, and an increase in 11, and this in the county in which the scheme has every advocacy, and is fostered in every conceivable way.

Next consider the results of instruction in Lancashire. It must be borne in mind that pupils who have not sufficient knowledge to enable them to pass an examination for the 5th class, "for" (says the Directory) "the fifth-class standard is only such as will justify the Examiner in reporting that the instruction has been sound, and that the students have been benefited by it," may swell totals, but the results of their instruction, in the deliberate opinion of the Department, are *nil*.

SUBJECTS TAUGHT.	No under instruction.	Total No. that passed examination.	TOTAL NO. ARRANGED IN CLASSES.				
			1	2	3	4	5
Geometrical drawing	668	144	33	31	18	13	49
Machine drawing	550	208	29	21	94	37	32
Building construction	345	125	15	22	40	20	28
Elementary mathematics	91	18	2	1	6	4	5
Theoretical mechanics	147	17	0	4	7	3	3
Applied mechanics	48	7	2	1	3	0	1
Acoustics, light and heat	285	60	3	9	26	8	14
Magnetism and electricity	81	19	0	6	6	4	3
Inorganic chemistry	744	152	1	7	34	47	53
Organic chemistry	97	8	0	3	3	3	2
Geology	104	31	2	5	12	8	4
Animal physiology	233	76	5	18	27	7	19
Zoology	6	4	0	1	3	0	0
Structural and economic botany	20	2	0	1	0	1	0
Mining	11	1	0	0	1	0	0
Metallurgy	20	12	0	0	3	0	9
Physical geography	173	54	3	8	8	19	16

These results should also be considered with reference to their distribution among the towns named in the "Comparative Statement."

TOWNS.	No. of candidates who have passed the several examinations:—1. Geometrical drawing. 2. Machine drawing. 3 Building construction. 4. Elementary mathematics. 5. Theoretical mechanics. 6. Applied mechanics. 7. Acoustics, light and heat. 8. Magnetism and electricity. 9. Inorganic chemistry. 10. Organic chemistry. 11. Geology. 12. Animal physiology. 13. Zoology. 14. Structural and economic botany. 15. Mining. 16. Metallurgy. 17. Physical geography.																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Accrington	...	..	.	...	.	..	2	6	12	..	3	...	...	...	...	...	...
Ashton-under-Lyne	1	10	..	..	...	..	.	..	..		...	...	...	...	..	..	..
Bacup	..	...	..	..	...	..	6		2	...	...	..	...	...	...	...	8
Blackburn (2 schools)			..		..		7	7	9	..	...	...	3	...		...	..
Bolton (4 schools)	19	40	31	...	3	2	1	4	18	...	...	7	..	..	...	..	9
Burnley (5 schools)	..			...	2	...	14	5	18	..	5	...		...		...	19
Bury	20	26	24	...	...				3		..	...	..	...	...		...
Chorley	8	..	..		..	..	...		..	...	...	...		...	...	...	..
Clitheroe	...		..	.		...		4	3	.	...	.	..		...		...
Darwen	...	...	.				7		6			..	...	...		...	..
Droylsden	7	14	8	..	...	..		..	4	5		...		...			.
Denton	...	..	..	..		..	.		.			..	..	...	..	...	...
Haslingden	..	...	..	...	.	..	4	.	..	...	...	.	...	...	. .		3
Heywood	9	15	11		...		.		3	...	...			...	...	...	
Lancaster	...	...	.	3		..	...		4	..		8	.	...	...		
Liverpool (2 schools)	.	...		12	3		5	2	14	..	...	5		...		...	
Manchester (6 schools)	18	29	21	2	1	2	1	..	21		...	52	2	1		12	1
Middleton	.	...	..	...	..	...				..			...	1		...	15
Nelson-in-Marsden	2	.					11	..		...	18		...	...	...	..	...
Newton Heath	7	6	..				...	.	4	3	...	..		...		...	
Oldham (4 schools)	49	55	32	2	3	1	..	...	1	..	...	...		...			
Padiham	...			...	..	...	2		...		...	..	...	...	..		.
Pendleton (2 schools)	1	6		..		...	1		..	...	...		..	..	...		.
Preston	...	.			4	..		.	3		2	3	..	...	...	.	
Rhodes	.		..		...	..	-				..		...	...	..	...	..
St. Helens	...	.	..	.	...	..	..	...	4	...	..	...		...		...	
Salford	2	7	...	...	1	2	..	...	...	...	...	2	...	...	1	...	...

It matters not from what point of view the statistical returns of science teaching are regarded, the same unsatisfactory results present themselves. From a table of results, published in the last annual report of the Lancashire and Cheshire Union, I extract the following figures, showing the results of the science examinations in all the institutions included in the table, that were represented by candidates in 1864:—

Number of Institutions 13

NAMES.	No. of successful candidates.			
	1864.	1865.	1866.	1867.
Bacup Mechanics' Institution	17	20	9	17
Bollington Mechanics' Institution	18	0	0	0
Bolton Mechanics' Institution	44	80	51	52
Burnley Mechanics' Institution	46	88	17	13
Bury Athenæum	7	30	40	74
Crewe Mechanics' Institution	23	19	13	9
Haslingden Mechanics' Institution	46	8	19	9
Hulme Church Institution	4	8	0	0
Macclesfield	27	23	3	0
Manchester Mechanics' Institution	231	296	170	156
Rawtenstall	12	0	0	0
Salford Working Men's College	27	31	10	11
Stockport Mechanics' Institution	16	38	24	36

From these figures it will be seen that four institutions show no results in 1867; in one the results are the same; in five there is a considerable decrease; and in three only is there any increase. The results of science teaching commenced in 1864, and continued to 1867, being 518 successful students in 1864, against 377 in 1867.

I must not trouble you with further details. You will, however, allow me to make a few remarks respecting the "Comparative state of scientific instruction in Lancashire and Yorkshire." As the results of technical education may be approximately ascertained by the Examinations, and notwithstanding the number under instruction, only those are shown "to have benefited by it" who can at least pass the standard of the 5th class, the present state of instruction in Yorkshire may favourably compare with that in Lancashire. It must first be decided what are the subjects of instruction common to the two counties. I suppose I shall be allowed to assume that the following are essential:—Drawing, including design; mathematics and mechanics; light and heat; steam; chemistry; geology; mining and metallurgy.

From the above tables it will be seen that the subjects of animal physiology, consisting of instruction in human anatomy and physiology, and physical geography, form a considerable element in the totals of Lancashire results. I say not one adverse word respecting the importance of these subjects as parts of general education, but as they do not enter into the manufacturing requirements of Yorkshire, they must be eliminated from the comparison. Even in Lancashire, of the 52 successful Manchester candidates in the former subject, 37 are boys in the institution not over 14 years of age. It will also be noticed that geometrical and machine drawing figures largely in the Lancashire list. Here, however, more comprehensive data must be chosen for comparison, and the results of drawing as a whole, including design, must be considered, if we would arrive at a correct comparison of the efforts made for secondary education in the two counties. Let me invite attention to the following tables, compiled from the last report of the Department of Science and Art, in which it will be seen that the standard of education measured by results is far higher in Yorkshire than in Lancashire.

Instruction in drawing is recognised by the department under three heads:—

I. Schools of Art.
II. Night Classes.
III. Schools for the Children of the Working Classes.

I.—Schools of Art.

1. Table showing the schools of art in Lancashire and Yorkshire; number of students under instruction; number presented for examination in the 2nd grade; and number of artizans whose works were found satisfactory:—

Lancashire.

Town.	No. under instruction, 1866.	No. of students examined in 2nd grade.	No. passed as successful.	No. of artisans whose works were found satisfactory.	
				Elementary.	Advanced.
Burnley	95	23	4	5	1
Lancaster	264	68	20	3	2
Liverpool (N. district)	579	191	60	19	1
,, (S. district)	574	146	75	2	5
Manchester	358	66	26	4	29
Preston	152	47	16	3	2
Total	2,022	541	201	36	40

Yorkshire.

Town.	No. under instruction, 1866.	No. of students examined in 2nd grade.	No. passed as successful.	No. of artisans whose works were found satisfactory.	
				Elementary.	Advanced.
Bradford	106	88	18	4	6
Halifax	135	52	30	12	9
Hull	183	57	32	6	0
Leeds	479	192	93	67	3
Sheffield	317	54	25	74	13
York	118	37	14	12	4
Total	1,338	480	212	175	35

Comparative Results.

	No. under instruction, 1866.	No. of students examined in 2nd grade.	No. passed as successful.	No. of artisans whose works were found satisfactory.	
				Elementary.	Advanced.
Lancashire	2,022	541 or 26·7 per cent.	201 or 9·9 per cent.	36 or 1·7 per cent.	40 or 1·9 per cent.
Yorkshire	1,338	480 or 35·8 per cent.	212 or 15·8 per cent.	175 or 12·3 per cent.	35 or 2·6 per cent.

2. Table showing prizes awarded and payments for results:—

Lancashire.

Town.	No. of students who obtained 2nd grade prizes.	No. of students who obtained 3rd grade prizes.	National competition medals.			Queen's prizes.	Payments for results.		
			Gold.	Silver.	Bronze.		£	s.	d.
Burnley	1	3	...	...	...	...	14	5	0
Lancaster	5	3	...	...	1	...	19	10	0
Liverpool (N. district)	22	4	...	...	...	...	26	15	0
,, (S. district)	14	4	...	...	1	...	58	15	0
Manchester	10	5	...	2	5	1	55	5	0
Preston	3	3	...	...	1	...	13	3	4
Total	55	22	...	2	8	1	187	13	4

Yorkshire.

Town.	No. of students who obtained 2nd grade prizes.	No. of students who obtained 3rd grade prizes.	National competition medals.			Queen's prizes.	Payments for results.		
			Gold.	Silver.	Bronze.		£	s.	d.
Bradford	5	2	...	1	...	...	13	0	0
Halifax	10	8	...	...	1	...	40	5	0
Hull	6	2	...	...	...	1	24	10	0
Leeds	46	17	...	...	1	1	123	15	0
Sheffield	13	23	...	...	...	2	87	15	0
York	8	5	...	...	...	1	36	0	0
Total	88	57	...	1	2	5	325	10	0

Comparative Results.

	No. under instruction.	No. of students who obtained 2nd grade prizes.	No. of students who obtained 3rd grade prizes.	National competition medals.			Queen's prizes.	Payments for results.		
				Gold.	Silver.	Bronze.		£	s.	d.
Lancashire	2,022	55	22	...	2	8	1	187	13	4
Yorkshire	1,338	88	57	...	1	2	5	325	5	0

II.—Night Classes.

Lancashire.

Town.	No. under instruction.	No. examined in 2nd grade.	No. successful.	No. of 2nd grade prizes.	No. of artisans whose works were satisfactory.	No. of 3rd grade prizes.	Payments for results.		
							£	s.	d.
Accrington Mechanics' Institution	14	10	5	2	...	...	5	0	0
Middleton Mathematical School	27	16	8	3	..	...	6	0	0
Total	41	26	13	5	...	...	11	0	0

Yorkshire.

Town.	No. under instruction.	No. examined in 2nd grade.	No. successful.	No. of 2nd grade prizes.	No. of artisans whose works were satisfactory.	No. of 3rd grade prizes.	Payments for results.		
							£	s.	d.
Holbeck Mechanics' Institution	30	10	8	3	5	6	9	10	0
Hunslet Mechanics' Institution	26	18	8	4	6	2	10	0	0
Keighley Mechanics' Institution	45	34	18	7	14	6	19	10	0
Kirkstall Educational Institute	41	38	15	7	16	6	18	0	0
Total	142	100	49	21	41	20	57	0	0

Comparative Results.

	No. under instruction.	No. examined in 2nd grade.	No. successful.	No. of 2nd grade prizes.	No. of artisans whose works were satisfactory.	No of 3rd grade prizes.	Payments for results.		
							£	s.	d.
Lancashire (two classes)	41	26	13	5	...	...	11	0	0
Yorkshire (four classes)	142	100	49	21	41	20	57	0	0

III.—Schools for the Children of the Working Classes.

Comparative Results.

County.	No. of towns connected with the department.	No. of children taught drawing.	No. examined.	No. satisfactorily taught.	No. showing proficiency.	Payments for results.		
						£	s.	d.
Lancashire	11	8,045	4,679	1,568	562	216	17	0
Yorkshire	20	6,746	3,501	1,383	691	239	5	0

It may be said that the foregoing tables deal with drawing as an art and not as a science, and that geometrical and machine drawing come under the latter category. It may be so. In Yorkshire artisans attend the schools of art to be instructed in these subjects, and are successfully taught therein, but the Department, while it gives payments on results if the pupils are taught by a late pupil who has passed an examination in the second class, will not recognise the labours of its own art-masters, who are fully qualified to give the necessary instruction; who do give the instruction; whose pupils in many cases go in to the examination, but whose labours are not recognised; nor do the results enter into a comparative statement of science classes.

In mathematics and mechanics the results are too small for comparison; in fact, these subjects testify to the non-success of the scheme. The higher mathematics—science classes, including algebra, plane and spherical trigonometry, mensuration—had only five successful candidates in England, one in London, and four at Plymouth; and the science classes in applied mechanics, requiring a knowledge of the general principles of mechanism, could only produce in England thirty-eight successful candidates; and the same remarks apply to geology, mineralogy, mining, metallurgy, and steam. In these subjects, not only are Lancashire and Yorkshire behindhand, but the whole country is so likewise.

The results of geology in Lancashire are mainly gained at the institution at Nelson-in-Marsden, and there it is unconnected with the daily toil of the students, for in running through the list, I see no other description than that of weaver, warehouse boy, office boy, and the like. Of mineralogy there is no notice in the list, and there are only 28 successful candidates throughout the country.

Lancashire certainly has an advantage over Yorkshire in mining, for it has 11 candidates under instruction, one only having been so taught as "to profit by the instruction given." This must not be placed to the discredit of Lancashire, for only 9 candidates have been successful in the science classes of England and Wales; 26 candidates gained certificates, but 17 are entered as self-taught.

Of the 34 successful candidates in metallurgy, 12 candidates are to the credit of Lancashire and 3 to Yorkshire, but all the Lancashire candidates are boys 12, 13, and 14 years of age respectively, while the Yorkshire candidates are artisans.

Steam is unknown as a science class subject in either county, yet the government syllabus is most comprehensive; treating of the general properties of steam; the different kinds of steam engines; description of boilers; methods of measuring efficiency of steam; its practical working, and so forth. In Great Britain and Ireland only seven towns are represented, and most of the candidates were sent from Plymouth and Hull.

Acoustics, light and heat, grouped as one subject, and magnetism and electricity, are the only subjects in which a comparison between Lancashire and Yorkshire can be drawn favourable to the former; but I will leave manufacturers to strike the balance, after they have considered the results of the instruction in chemistry as follows:—

ORGANIC CHEMISTRY.

	No. of pupils under instruction.	Total No. that passed examination.	Total No. arranged in classes.				
			1	2	3	4	5
Lancashire	97	11 or 11·3 per cent.	0	3	3	3	2
Yorkshire	24	16 or 66·6 ,,	2	2	7	4	1

INORGANIC CHEMISTRY.

	No. of pupils under instruction.	Total No. that passed examination.	Total No. arranged in classes.				
			1	2	3	4	5
Lancashire	741	152 or 20·4 per cent.	1	7	34	47	53
Yorkshire	163	55 or 33·7 ,,	5	6	11	14	19

I now submit that the foregoing tables of results prove that the science classes of the Department of Science and Art are exercising but the smallest influence upon technical education, and that nationally the standard of the same is very low. I further submit that Yorkshire is not behind Lancashire in its educational results even at present, and that all the advocacy in Lancashire has failed to maintain classes that have been established, while the results, as tested by examination, are very small; moreover, that the scheme has not been without advocacy in Yorkshire. In addition to the labours of the late Mr. B. Blake, agent to the Yorkshire Union of Mechanics' Institutes, who, in season and out of season, pressed the scheme upon the managers of institutions, the organising master of science classes, Mr. Buckmaster, has year after year met the delegates of the associated institutes at the annual meetings, until in 1865, being present by special invitation, he stated that he could add nothing to what in previous years he had said on the subject.

Notwithstanding the foregoing adverse remarks respecting the results of the Science Classes Examination, I am not opposed, except as regards the tentative nature of the scheme, and the minor arrangement of details, to the system of the Department. On the other hand, I think it requires but very slight alterations to cause it to produce all that is desired for the technical education of the mass of our skilled workmen. The causes of failure are beyond its control. But I do most strongly object to totals being paraded, which delude those who cannot spare time for an examination of details, and foster the belief that a great work is being done in our science classes, whereas we, who are constantly in the midst of educational work, know that the fruit of science classes will be very small until the nation is permeated with primary education of a higher standard than at present exists.

I am, &c.,
Henry H. Sales, Visiting Officer
for Yorkshire.

Industrial and Scientific Education. — The Working Classes of Nassau.—Sir,—Resuming the extracts from my report on the condition of the working classes in the late duchy, now Prussian province of Nassau, I hope it will not be supposed that I approve, and hold up for imitation, all that I relate. To begin with the compulsory system of education. Setting aside the question of right, and the consideration whether the upper classes of society pay that enlightened attention to education which would entitle them to prescribe strict rules for the lower ones, I doubt the expediency of attempting, at the present time, to introduce compulsion as regards attendance at school; the more so, as nearly the same end may be attained by compulsion as regards the providing of schools, and inducements as concerns the use of them. Then, again, I believe that to propose the adoption of the German educational period of 6 to 14 years of age would be to raise unnecessary difficulties, unless the proposal should be based on the half-time system. Be this as it may, the German programme of attainments given in my previous letter is rather too high for us. Moreover, I would substitute the more comprehensive range of natural science for that of natural history. There are a few great facts in each of the three kingdoms of nature so important, and at the same time so interesting and so easy when properly taught, that no child should be entirely ignorant of them, any more than of the fact that the earth turns round. But there are certain equally simple elementary data in other branches of natural science, which have a still more direct bearing on the requirements of daily life. What everyone wants, and what, among the working class in particular, may essentially promote health, physical comfort, and industrial success, is what may be called practical bionomy or the science of common life. It is made up as follows:—1st. A common sense selection of the simplest and most indispensable facts and principles of physics and chemistry, with merely a few outlines of natural history in general, but a good insight into human physiology in particular. 2nd. The applications of this preparatory knowledge to the ordinary concerns of life, as included in a full circumscription of domestic and sanitary economy.[*] It is evident that practical bionomy, thus constituted, is, as far as science is concerned, the best general foundation a lad can have for his future industrial career; but there are a few further portions of knowledge, mostly appertaining to chemistry, mechanics, and geometry, of which, according to the nature of his prospects, it may be exceedingly useful for him to be as well informed before he leaves school for his apprenticeship, as circumstances may allow. It is only by a thoughtful *ponderation* of the relative value of the things which children can possibly be taught in the limited time, and with the very limited resources devoted to primary education, and by preparing accordingly a scheme of studies, of an obviously practical character, clear and well defined, yet susceptible of adaptation to local circumstances, that the serious difficulties can be overcome which impede the development of science in our national schools; and it will be only by means of a centralised organisation, competent to deal with every detail, and to keep every wheel going, that we may hope to see popular education undergo, safely and successfully, that scientific regeneration which Liebig has rightly pronounced to be "a necessity of our age." The greatest tact and caution will be required in avoiding to interfere with religious susceptibilities, which are in this country more difficult to deal with than appears to have been the case in Nassau. "The population of Nassau consists of Protestants and Roman Catholics in the proportion of about three of the former to two of the latter. There are also a few German Catholics and Jews. Some districts contain only Protestants, others only Catholics. In many places they are mingled together in various proportions, always enjoying equal rights. In purely Evangelical parishes Evangelical teachers are appointed; in purely Roman Catholic places Roman Catholics; in places of a mixed population both (or if the place is small the preponderating number decides the question). 'A long experience,' says a respectable person, to whom I owe much information on this subject, 'has proved the practicability of a just poising of interests under circumstances apparently most difficult. If people see that you proceed with a conscientious endeavour to act with impartiality and justice, they are readily satisfied.' The same plan of friendly adjustment extends through the whole system. Thus, the local clergymen, appointed with the title of inspectors to superintend the spring examinations, and to exercise at all times a salutary control, are likewise selected from both persuasions. I am assured by a Catholic master, whose village school used to be visited by a Protestant inspector, that this difference of creed, instead of producing distrust on either side, seemed rather to elicit increased urbanity." The *Gewerbe Verein*, or Industrial Society of Nassau, has done much for supplementing the ordinary school education with evening and other classes; but these need not detain us, resembling as they do those of Wurtemburg, lately described to us by Mr. Davidson, and I pass on to the system of apprenticeship. "The would-be artisan must be able to exhibit proof of having concluded his attendance at school (which, as I have mentioned elsewhere, is obligatory from the sixth to the fourteenth year) by satisfactorily passing his final examination; he must also have passed his confirmation, which takes place about the same time; it is preceded for a considerable period by strict religious instruction, and is solemnized by both Protestants and Catholics in a very impressive manner." I am told that with Protestants the period of preparation is generally 10 or 11 months, during which the clergyman daily gives an hour's instruction, chiefly in their catechism, which is much more comprehensive than ours. I may here mention that the Bible is much less made use of in schools as a text-book for the training of the memory, and the development of the intellect, than with us. In fact, parents and teachers seldom put it, especially the Old Testament, in the hands of children. They seem to think that as, in a social point of view, Christians select and adopt only certain portions of the Jewish laws and customs, so likewise they are at liberty to select, in an educational point of view, those portions of narrative which they consider most likely to produce good fruits in the youthful mind. Accordingly, instead of making, as we do, the actual text of Scripture the groundwork of popular education, they prefer using a compendium of its important facts and moral lessons. "If a lad is quite a dunce, and especially if he cannot satisfactorily get through his catechism, he may be retained under tuition for another year; or, if his vicious propensities are found incorrigible by ordinary means, he may be sent off to a disciplinarian school. If all is tolerably right, the lad receives in due form his educational certificate, and he and his friends set about looking out for the right sort of shop, and a comfortable master; but, before a definitive agreement is come to, German prudence steps in very appropriately and prescribes two weeks' preliminary trial. If this turns out to mutual satisfaction, a contract is drawn up, of which the legalization is obtained with very little expense, or none at all if the parties are poor. For ordinary trades, such as those of the shoemaker, tailor, joiner, baker, &c., the usual term is three years, and the total sum to be paid to the master varies from thirty to sixty florins (£2 10s. to £5), or a term of four years is agreed upon, without payment, the work of the apprentice in the last year being expected to form an equivalent. With respect to more difficult trades, such as those of the watchmaker, mechanician, lithographer, &c., the term is usually three or four years, with a payment of eighty to two hundred florins (£6 13s. 4d. to £16 13s. 4d.). Some few trades, requiring little or no technical training, are exceptional with regard to payments; thus apprentices engaged in operations of building, whitewashing, &c., not only have nothing to pay, but receive at once a daily remuneration of a few pence. In no case does an apprenticeship last longer than four years. As far as I have been able to ascertain, serious disagreements between masters and apprentices are less frequent in Germany than with us. One legitimate cause of dissatisfaction on the part of the apprentice, which frequently occurs in England, is the incompetency of the master to teach all he engaged to teach. This is in some measure obviated in Germany by the examination which must be undergone before an artisan can settle anywhere as master; but in all cases redress is facilitated by the practice of paying the stipulated sum by instalments, so that one-third or one-half of the amount stands over to the conclusion of the term. If an apprentice has just cause for complaint, he is released by the local authorities from further obligations towards his master, and his friends from further payment. At the expiration of his term the apprentice must furnish proof of the extent of his acquirements, by executing some appropriate piece of handiwork, in the presence of the official judges of the trade, forming a kind of jury, which, from its usefulness, deserves some attention. Every three years the masters in each trade, residing in a district, or in a group of districts, if the trade is a scarce one, assemble to elect, or re-elect three representatives for the purpose of examining the certificates, and of testing and recording the abilities of industrial candidates. Such is the Board of Examiners, which we now find sitting in judgment on the merits of the young artisan anxious to emerge from his apprenticeship, and which we shall meet with again in a further stage of his career. If the examiners are not satisfied with the young man's performance, he must find means of improving himself within half-a-year, against another trial; if, on the contrary, they are well-pleased, he obtains his certificate as *gesell*, or journeyman, and sets out for his travels. Those to whom German literature is familiar, will remember that the *wanderschaft*, or travelling apprenticeship of young artisans, is included in the world of poetical ideas and associations peculiar to the Germany of the olden time. It is true that, about the year 1819, the guild system was handled in a manner which nearly amounted to its abolition in the Duchy of Nassau, and that the *wanderschaft* ceased to be obligatory; moreover, railroads and police have done much in these prosaical days to deprive this custom of its colouring of romance; but, nevertheless, it still retains enough of the character of the industrial period in which it had its origin, midst potent guilds and jolly companionships, to render a special inquiry both entertaining and instructive. For our present purpose a brief summary of its leading features will suffice. When the *gesell* arrives at a town, he goes forthwith to the specially appointed inn of his trade, where the inn-father, from whom he is entitled to receive paternal attentions and advice, shows him a register, in the form of a slate or black board, on which is inscribed the name of any master wanting a hand. If the register is a blank, and the *gesell* has no cash in purse from previous savings, he may claim his *viaticum*, or travelling money, which is either paid from the treasury of the town, or from a subscription-purse of the trade, or made up by small donations which he gets at the several workshops of his calling, where he applies in succession for that purpose; in so doing, he generally makes good his claim to brotherly assistance by some token which he bears, or by mysteriously symbolical signs and passwords, analogous to those used in freemasonry. At Frankfort, where trade affairs are reckoned to be on a more liberal, or more antiquated footing than elswhere, an itinerant servant of the proud company of hair-cutters receives, from a special purse, as much as thirty-six kreutzers (one shilling); but this may be counted exceptional, and in the generality of cases the total amount which a common journeyman obtains by legitimate means is no more than a few pence: at all events the sum is definitive; except in case of illness, no further sum can be claimed, and it will be well if the next morning's dawn sees our wanderer trudging contentedly onward, his knapsack on his back, with a boot sticking out at each end of it, and his faithful pipe dangling at the side of his mouth, whilst he sings some classical ditty of the brotherhood. Often, however, his prospects are far from encouraging, and his heart grows heavy as he slowly puffs his last pipeful. The very apprenticeship through which he has acquired the knowledge of his trade, binds him to its narrow and exclusive regulations. He can only exercise it by placing himself at the disposal of a licensed master; the law forbids him, under penalty, to undertake anything on his own account; and I am assured that this enactment is rigorously enforced. There was a time when the industrial vocabulary construed the word *fechten* as a justifiable kind of begging, which did not disgrace a needy journeyman, but now it is inscribed in the black-book of the police; and if a poor fellow, compelled by sheer necessity, extends an unwilling hand towards a stranger, and a *gendarme* espies him in the act, he is not only punished with arrest, but this fact is noted down in his pass-book, and subjects him, wherever he goes, to be watched with a suspicious eye, and to increased severity in case of a repetition of the offence. In relation to its moral tendency, this thick-and-thin life of labour and adventure has little to recommend it. In a technical point of view it is undoubtedly productive of good results. If endowed with an observing turn of mind, the *gesell* may acquire in his travels not only practical experience in all the branches of his calling, but a valuable knowledge of the various methods and contrivances used in various countries; and it is indeed his chief consolation in the hardships he has to undergo, that those acquirements may one day enable him to ascend into a higher industrial region, where he will be no longer a dependent, and need no longer remain a bachelor."—I am, &c., T. Twining.

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[*] I am now preparing a synopsis of this natural range of useful knowledge for the use of teachers in elementary schools, and am prepared to devote £100 per annum, for three years, to special examinations and prizes in connection therewith.

Twickenham, 30th Dec., 1867.

MEETINGS FOR THE ENSUING WEEK.

Mon......British Architects, 8.
Entomological, 7.
Medical, 8.
Victoria Inst., 8.

Tues ...Pathological, 8. Annual Meeting.
Ethnological, 8. 1. Mr. Albert S. Bickmore, "Some Notes on the Ainos." 2. Mr. John Crawfurd, "On the History and Migration of Plants yielding Textile Materials."
Syro-Egyptian, 7½.
Royal Inst., 3. Professor Tyndall, "On Heat and Cold." (Juvenile Lectures.)

Wed ...Geological, 8. 1. Mr. W. W. Stoddart, "On the Lower Lias of Bristol." 2. Mr. C. O. Groom Napier, "On the Lower Lias at Cotham, Bedminster, and Bristol." 3. Mr. W. Boyd Dawkins, "On the Dentition of *Rhinoceros Etruscus*."
Graphic, 8.
Microscopical, 8.
Literary Fund, 3.
R. Society of Literature, 4½.
Archæological Assoc., 8½.

Thur ...Royal, 8½.
Antiquaries, 8½.
Zoological, 8½.
R. Society Club, 6.

Fri.......Astronomical, 8.

Sat ......R. Botanic, 3¾.

Patents.

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From Commissioners of Patents' Journal, December 27.

Grants of Provisional Protection.

Ammonia, &c., extraction of—3566—A. M. Clark.
Arithmetic, &c., imparting instruction in—3546—J. Williams.
Bedsteads and mattrasses—3594—R. D. Dwyer.
Bedsteads, &c.—3610—J. Atkins.
Bench planes and moulding tools—3552—W. E. Newton.
Boilers—3483—R. B. Jones and W. Powell.
Boilers—3514—W. J. Fraser.
Boilers, preventing and removing incrustation in—3586—W. Ross and A. Long.
Boots and shoes, cleaning—3606—G. H. Ellis.
Bricks and tiles—3534—P. Bawden.
Buildings, warming—3457—W. A. Herring.
Buildings, warming—3487—J. Partington.
Caissons—3526—J. R. Baillie.
Canal boats, &c., propelling—3604—H. H. Murdoch.
Candles—3536—H. Field.
Carriage wheels, &c.—3524—J. Goodman.
Carpets, manufacturing—3394—A. Turner and W. E. Newton.
Cask headings, &c., shaping—3497—W. Clapperton.
Castors for containing pepper, &c.—3414—G. Heiron.
Chains, iron and steel—3515—A. Camme and F. Delpech.
Churns—3560—R. Tinkler.
Coffee-pots, &c., bags for—3462—J. Mabson.
Cotton, &c., sizing—3481—C. Brazil.
Doffing-knife apparatus, lubricating—3448—J. Newton.
Door bolts and indicators—3550—J. G. Settle.
Engines, steam—3512—G. Holcroft and W. N. Dack.
Engines, &c., steam—3576—G. D. Kittoe.
Fabrics, finishing—3504—R. G. Lowndes.
Fabrics, finishing woven—3612—A. Cochran.
Fabrics, preparing for dyeing—3384—J. Baylis.
Fibrous materials, spinning and doubling—3455—J. T. Webster and W. Oxley.
Fibrous materials, treating—3510—J. W. Burton.
Fibrous substances, preparing for spinning—3489—W. Clissold.
Fibrous substances, twisting—3582—N. Haley and J. Hodgson.
Filters—3503—C. Kerby.
Fire-arms and cartridges—3539—W. Richards.
Fire-arms, breech-loading—3324—J. H. Johnson.
Fire-arms, breech-loading—3409—R. Clay, jun.
Fire-arms, breech-loading—3616—J. Kerr.
Fire-bricks, &c.—3501—H. Bessemer.
Fountains—3568—E. Rimmel.
Frames, spinning and twisting—3533—J. Collingham & T. E. Smith.
Fuel, artificial—3544—J. H. Johnson.
Furnaces—3459—D. Smith.
Furnaces—3467—M. Tildesley and J. Bird.
Furnaces—3592—H. Green.
Games of skill, apparatus for playing—3213—T. Taylor.
Gas retort ovens and furnaces—3554—H. Atkinson.
Grasses, &c., spreading—3475—W. N. Nicholson.
Guns, &c.—3562—G. Clark.
Hats and bonnets—3513—H. Giles.
Haymaking machines, &c.—3538—R. Boby.
Hops, &c., training—3509—J. Grout and E. Mathews.
Iron and steel, manufacturing—3614—W. H. Richardson.
Knife-cleaners—3485—O. Barrett and H. Leggott.
Lamps—3532—W. G. Hanning, G. B. Knott, and L. C. F. Clerc.
Lamps to be used under water—3527—J. Ward.
Mannre—3518—A. T. Carr.
Metal, manufacturing malleable—3463—S. Perkins and W. Smellie.
Metal sheets, corrugating—3511—J. Woolfield.
Mohair, &c., manufacturing—3540—J. Robinson.
Money, &c., transmitting—3464—J. G. Scott.
Motive-power apparatus—3087—H. W. Grylls, H. Neville, & J. Holt.
Motive-power engines—3508—W. B. Leachman.
Moulds, &c., coating the interior surfaces of—3473—J. Durrans.
Mustard, &c., appliances for serving—3519—J. M. Napier.
Needles, making up packets for sale—3584—A. Shrimpton.
Needles, &c., fixing on reels or receivers—3436—W. Pidding.
Ordnance—3507—W. Palliser.
Ordnance, breech-loading—3453—E. Walker.
Ornaments, &c.—3479—R. Jones and J. Abrahall.
Orthopœdic apparatus—3493—A. M. Clark.
Paper, &c., treating—3535—E. R. Sintzenich.
Pipes, socket and flange spigot—3491—C. M. Barker.
Powders, explosive and fulminating—3469—P. G. L. G. Designolle and J. Casthelaz.
Presses for stamping—3516—A. M. Clark.
Printing machines—3570—W. Conisbee.
Pumps, steam—3531—E. Death.
Railway cuttings, &c., measuring the quantities of earth-work in—3506—W. H. Barlow.
Railway engine wheels, &c., securing the tyres of—3525—J. O. Butler.
Roads, constructing—3596—J. Murray.
Rocks, &c., boring—3386—T. B. Jordan and J. Darlington.
Ropes, &c., washing and sizing—3588—S. Marsters.
Saws—3522—T. A. Weston.
Scenic illusions, treating—3541—J. H. Pepper and T. W. Tobin.
Screens for preventing the spreading of fire—3523—G. A. Young.
Ships' blocks, &c., pulleys for—3521—G. H. Nick.
Skates—3564—T. C. Parson, jun.
Skirts, manufacturing fabrics for—3618—W. B. Pullar.
Stables, &c., fittings for—2698—J. Musgrave.
Straw elevators, apparatus for driving—3477—F. Roper.
Sugar-breaking machinery—3461—J. Green.
Sugar syrup, treating—3574—J. Dawson.
Tin, reducing—3517—A. M. Clark.
Umbrellas and parasols—3505—C. Conner.
Valves, slide—3528—R. Roberts and P. Williams.
Vegetable juices, preserving—3499—L. Rose.
Vehicles, registering number of passengers entering—2573—W. Baird.
Washing machines—3558—W. and F. Bates.
Water, raising—3590—W. A. Gilbee.
Water-tuyeres—3529—R. W. Brownhill.
Windows, &c., sliding the sash frames of—3620—B. Monson.

Inventions with Complete Specifications Filed.

Cotton ties—3645—W. Walker.
Lamps—3602—M. H. Collins.
Liquids, measuring—3624—L. L. Tower.
Ventilators—3626—J. T. Kershaw.

From Commissioners of Patents' Journal, December 24.

Patents Sealed.

1870. J. Gabbott.
1871. W. Bullough.
1884. W. Marshall.
1886. C. O. Heyl.
1892. C. Brown.
1896. J. Holroyd and W. Fieldhouse.
1897. C. O. Heyl.
1898. P. Zaroubine.
1899. P. Smith.
1902. A. Hodge.
1904. S., R., and W. Trulock.
1905. W. H. Richardson.
1906. A. Stewart.
1910. C. Petit.
1918. F. T. Pollard.
1951. E. M. Brown.
1959. F. Brady.
1972. H. C. Carver.
1974. W. C. Church.
2007. W. Avery.
2030. A. H. Brandon.
2119. J. Saxby.
2194. D. Hodge and R. C. Witty.
2231. J. Birch.
2475. A. H. Brandon.

Patents on which the Stamp Duty of £50 has been Paid.

3119. F. A. Chevallier.
3171. J. Ramsbottom & T. Blackburn.
3150. J. Butchart, H. Stroud, and S. A. Morrison.
3195. R. A. Brooman.
3176. J. Hargreaves.
3174. W. Reid.
3175. J. H. Johnson.
3191. J. Paterson.
3236. T. R. Harding.
3250. T. Bouch.

From Commissioners of Patents' Journal, December 31.

Patents Sealed.

1915. J. G. N. Alleyne.
1916. J. Chaudron.
1917. F. T. Hubert and H. D. G. Truscott.
1919. P. Ironside.
1921. W. Duce.
1924. G. A. F. Fowke.
1925. T. and J. Wood.
1927. J. Sturgeon.
1930. G. Gordon.
1934. F. R. Aikman.
1935. J. McKibbin.
1937. W. Galloway and G. Plant.
1938. D. P. Morison.
1945. W. Thompson.
1954. J. Verreyt.
1960. J. Bolton.
1976. W. R. Gorst.
1986. J. C. Major.
1992. I. M. McGeorge & A. Paul.
1997. A. Mather.
2006. G. Gabillon.
2013. W. R. Lake.
2024. G. Davies.
2027. W. E. Newton.
2032. J. B. Fraser.
2044. E. H. Bernier.
2105. W. Barningham and J. Thompson.
2130. J. Hooper.
2137. W. E. Newton.
2155. A. M. Clarke.
2160. W. E. Newton.
2161. A. Wilson.
2174. J. Smith and W. Schofield.
2179. W. E. Newton.
2208. B. Dobson and J. Cocker.
2217. J. Saxby.
2296. R. Heathfield.
2301. E. Newby.
2346. F. H. Wenham.
2429. W. E. Newton.
2452. J. H. Johnson.
2457. J. Macintosh & W. Boggett
2530. T. Cook.
2581. J. B. Meldrum.
2622. F. H. Varley.
2740. G. R. Solomon, jun.
2927. E. T. Hughes.
2962. T. Webb.

Patents on which the Stamp Duty of £50 has been paid.

3177. R. Wilson.
3207. E. Morewood.
3214. H. Hicklin and C. Pardoe.
3228. R. H. Leese.
3219. J. Dodge.
3227. W. H. Preece and A. Bedborough.
3233. M. A. Muir & J. McIlwham.
3222. J. R. Breckon & R. Dixon.
3248. H. A. Bonneville.

Patents on which the Stamp Duty of £100 has been Paid.

3172. W. Hill and H. Barber.
3182. W. E. Newton.
3. M. Henry.